

WE CLAIM:

5 1. A hinged, composite structure comprising a rigid thermoplastic coated fabric having at least two pre-determined rigid composite areas, said areas adjoining through at least one flexible hinged region permitting rotation of one rigid area relative to another about the hinged region.

10 2. The structure of Claim 1, wherein said hinged region comprises a linear region formed between said first and second rigid areas.

15 3. The structure of Claim 2, wherein said linear region comprises a flexible thermoplastic.

20 4. The structure of Claim 3, wherein said flexible thermoplastic encloses said fabric, said fabric free of rigid thermoplastic, within said flexible regions.

25 5. The structure of Claim 1, wherein pre-determined portions of said rigid areas are non-coplanar.

6. The structure of Claim 1, wherein said rigid areas include bends at pre-determined distances from said flexible regions.

7. The structure of Claim 1, wherein at least one fabric edge is folded.

25 8. The structure of Claim 7, wherein the width of said folded edges is less than 5 centimeters.

9. The structure of Claim 1, wherein said rigid areas have properties comprising:

5 (a) a modulus of elasticity of about 830 kpsi or greater;
(b) a coefficient of thermal expansion of about 0.000022 in/in/ $^{\circ}$ F or less;
(c) a shrinkage not exceeding about 0.28%; and
(d) an impact of about 10 in-lbs or greater.

10 10. The structure of Claim 9, wherein the standard deviations of each listed property are within $\pm 12\%$ of the mean value.

11. The structure of Claim 1 wherein the ratio of resin to fabric of said first and second rigid areas comprises about 5 to 50 parts by weight of fabric and about 50 to 15 95 parts of resin per each 100 parts of composite by weight.

12. The structure of Claim 1, wherein said fabric is a woven fabric.

20 13. The structure of Claim 1, wherein said fabric is a non-woven fabric.

14. The structure of Claim 13, wherein said fabric is a glass fiber containing fabric.

25 15. The structure of Claim 14, wherein said first and second rigid areas comprise about 70 to 90 parts by weight thermoplastic resin and about 10 to 30 parts by weight glass fabric.

16. The structure of Claim 14, wherein said glass fabric comprises a plain weave fabric comprising about 5-20 ounces of fabric per square yard.

17. The structure of Claim 14, wherein said fabric is a 5-15 pick fabric.

18. The method of Claim 14 wherein said glass fabric further comprises a
5 surface coating on said glass fiber.

19. The structure of Claim 18 wherein said surface coating comprises a PVC
coating.

10 20. The structure of Claim 1, wherein said fabric is a polyamide fiber
containing fabric.

15 21. The structure of Claim 1, wherein said fabric is a cellulosic fiber
containing fabric.

22. The structure of Claim 1, wherein said thermoplastic comprises
polyvinylchloride.

20 23. The structure of Claim 1, wherein said thermoplastic comprises
polyolefin.

24. The structure of Claim 1, wherein said thermoplastic comprises
polyester.

25 25. A hinged profile comprising:

(a) a rigid thermoplastic coated flexible fabric having at least two pre-
determined, non-coplaner rigid composite areas, and

30 (b) at least one flexible hinged region joining said rigid areas.

26. The profile of Claim 25, wherein said rigid areas include bends at pre-determined distances from said flexible, hinged regions.

5 27. The profile of Claim 25, wherein pre-determined portions of said rigid areas are non-coplaner.

28. The profile of Claim 25, wherein said hinged regions comprise linear regions formed between said rigid areas.

10 29. The profile of Claim 25, wherein said linear, hinged regions comprise flexible thermoplastic.

15 30. The profile of Claim 29, wherein said linear, hinged regions are enclosed by flexible thermoplastic.

31. The profile of Claim 25, wherein at least one fabric edge is folded.

20 32. The profile of Claim 31, wherein said folded edges have widths less than 5 centimeters.

33. The profile of Claim 25, wherein the width of the hinged region (W) is related to bend angle α (in degrees), and radius of curvature (R) by the equation:

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$$W = (\alpha\pi R)/180^\circ$$

34. The profile of Claim 25, wherein said rigid composite areas have properties comprising:

- (a) a modulus of elasticity of about 830 ksi or greater;
- (b) a coefficient of thermal expansion of about 0.000022 in/in/°F or less;
- (c) a shrinkage not exceeding about 0.28%; and
- (d) an impact of about 10 in-lbs or greater.

35. The profile of Claim 34, wherein the standard deviations of each listed
10 property are within $\pm 12\%$ of the mean values.

36. The profile of Claim 25 wherein the ratio of resin to fiber of said first and second rigid areas comprises about 5 to 50 parts by weight of fabric and about 50 to 95 parts of resin per each 100 parts of composite by weight.

38. The profile of Claim 25, wherein said profile comprises a hollow trim
20 profile. ..

39. An exterior corner profile adapted to receive construction panels by rotating said first and second rigid areas of the structure of Claim 1 shown in Figure 1 through a clockwise bend angle of 90 degrees.

25 40. An interior corner profile adapted to receive construction panels by rotating said first and second rigid areas of the structure of Claim 1 shown in Figure 3 through a counter-clockwise bend angle of 90 degrees.

41. A method for making a hinged composite structure, said structure including a rigid thermoplastic-fabric composite comprising:

- introducing fabric to the interior of an extrusion die,
- extruding rigid thermoplastic onto at least two pre-determined areas of said fabric,
- coating said pre-determined areas with rigid thermoplastic to create a composite,

wherein said pre-determined areas are separated by a linear flexible hinged region free of thermoplastic.

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42. The method of Claim 41, further comprising the step of extruding flexible thermoplastic upon said hinged region.

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43. The method of Claim 41, wherein the process additionally comprises a folding step in which at least one fabric edge is folded prior to combination with said thermoplastic.

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44. The method of Claim 41, further comprising drawing composite through a shaping die following said coating step wherein pre-determined portions of said first and second rigid areas are made non-coplaner.

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45. A method for making a hinged, composite structure comprising a thermoplastic coated glass fabric, the method comprising:

- introducing the glass fabric into a shaping station including a shaping block to produce a pre-formed fabric shape conforming to the shape of said hinged composite;
- introducing at least one rigid thermoplastic into a co-extruder having inlet zones and combining zones wherein the thermoplastic(s) and preformed shaped fabric are combined to form said composite structure under conditions of sufficient pressure, temperature and shear to cause the polymer composition to

penetrate and wet individual glass fibers to the extent that the polymer composition substantially coats the glass fibers in said glass fabric; and

5 (c) extruding the thermoplastic-fabric composite through a shaping die to form said structure wherein the properties of said rigid areas comprise:

10 (i) a modulus of elasticity of about 830 kpsi or greater;

15 (ii) a coefficient of thermal expansion of about 0.000022 in/in/°F or less;

20 (iii) a shrinkage not exceeding about 0.28%; and

25 (iv) an impact of about 10 in-lbs or greater.

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46. The method of Claim 45, further comprising the step of coating said hinged regions with flexible thermoplastic.

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47. The method of Claim 45, further comprising a folding step wherein a shaping block introduces at least one edge fold in said fabric.

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48. The method of Claim 45 further comprising the step of co-extruding flexible thermoplastic upon said hinged regions of said fabric under temperature and pressure conditions sufficient to bond flexible thermoplastic to the surfaces of said hinged regions.

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50. The method of Claim 45, further comprising the step of passing said fabric through a shaping block wherein the exterior edges of said fabric are folded inward prior to introducing fabric into said extrusion die.

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51. A method for making a hinged profile comprising:

(a) introducing a fabric to the interior of an extrusion die.

(b) extruding rigid thermoplastic such that at least two pre-determined rigid areas of thermoplastic coated fabric composite are created, wherein said pre-determined rigid areas are separated by at least one flexible hinged region free of thermoplastic,

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(c) removing composite from said extrusion die,

(d) cooling said composite,

(e) rotating said rigid areas relative each other about said hinged regions to form said profile.

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52. The method of Claim 51, further comprising the step of co-extruding flexible thermoplastic upon said hinged fabric regions.

53. The method of Claim 52, wherein said hinged regions are entirely incorporated within said flexible thermoplastic.

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54. The method of Claim 51, further comprising the step of passing said fabric through a shaping block wherein at least one exterior fabric edge is folded inward prior to entry into said extrusion die.

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